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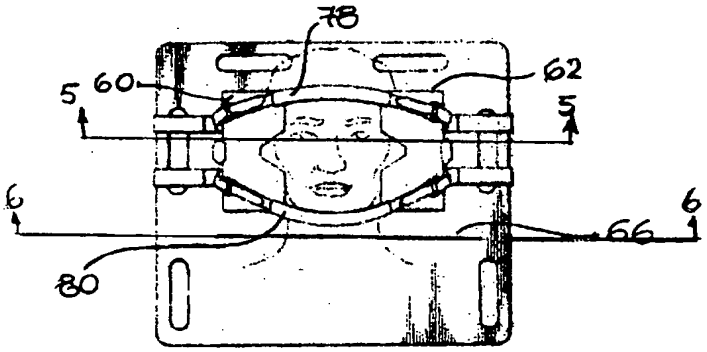
(54) **DISPOSITIF D'IMMOBILISATION DE LA TETE**
(54) **HEAD IMMOBILIZATION DEVICE**



(57) A foldable head immobilization device for immobilizing the head of a person relatively to a supporting surface is described herein. The head immobilization device is made of a flat blank of corrugated material and includes a central section and a pair of lateral sections. The central section may be folded to form a generally semi-cylindrical head receiving portion while each lateral section may be folded to define a generally triangular supporting portion. When in use, the width of the head receiving portion is adjusted by lateral displacement of the lateral supporting portions.

ABSTRACT OF THE DISCLOSURE

A foldable head immobilization device for immobilizing the head of a person relatively to a supporting surface is described herein. The head immobilization device is made of a flat blank of corrugated material and includes a central section and a pair of lateral sections. The central section may be folded to form a generally semi-cylindrical head receiving portion while each lateral section may be folded to define a generally triangular supporting portion. When in use, the width of the head receiving portion is adjusted by lateral displacement of the lateral supporting portions.

WHAT IS CLAIMED IS:

1. A collapsible head immobilization device for immobilizing the head of a person relatively to a supporting surface, said device comprising a pair of lateral sections and a central section extending therebetween; said central section being configured to receive the head in a spaced relationship relatively to the supporting surface.

2. A collapsible head immobilization device as recited in claim 1, wherein each said lateral section defines an essentially triangular supporting portion.

3. A collapsible head immobilization device as recited in claim 2, wherein each triangular supporting portion includes a base configured to contact said supporting surface and an opposite apex.

4. A collapsible head immobilization device as recited in claim 3, wherein said central section is connected to said apex of each triangular supporting portion.

5. A collapsible head immobilization device as recited in claim 4, wherein said central section includes cutout openings so configured and sized as to prevent the ears of the person to be laterally compressed.

6. A collapsible head immobilization device as recited in claim 5, wherein said each said triangular supporting portions includes a cutout opening allowing visual inspection of the ears of the person.

7. A collapsible head immobilization device as recited in claim 2, wherein each triangular supporting portion includes a nested internal triangular bracing portion.

8. A collapsible head immobilization device as recited in claim 7, wherein each said internal triangular bracing portion has a height of about a third of a height of each said triangular supporting portion.

9. A collapsible head immobilization device for immobilizing the head of a person relatively to a supporting surface, said device comprising an essentially flat foldable element defining a pair of lateral sections and a central section extending therebetween; said central section defining a head receiving portion having an adjustable lateral width; each said lateral section being so configured as to define respective supporting portions supporting said head receiving portion; said supporting portions being so configured as to (a) contact the supporting surface and (b) be laterally movable on the supporting surface so as to adjust said lateral width of said head receiving portion; wherein said lateral movements of said supporting portion provide automatic adjustment of the lateral width of the head receiving portion.

10. A head immobilization device as recited in claim 9, wherein said head receiving portion is configured so as to receive the head in a spaced relationship relatively to said supporting surface.

11. A collapsible head immobilization device as recited in claim 9, wherein each said supporting portion is generally triangular.

12. A collapsible head immobilization device as recited in claim 11, wherein each triangular supporting portion includes a base configured to contact said supporting surface and an opposite apex.

13. A collapsible head immobilization device as recited in claim 9, wherein said apex of each said triangular supporting portion is located at the junction between the central section and one lateral section.

14. A collapsible head immobilization device as recited in claim 13, wherein said head supporting portion includes cutout openings so configured and sized as to prevent the ears of the person to be laterally compressed.

15. A collapsible head immobilization device as recited in claim 14, wherein said each said triangular supporting portions includes a cutout opening allowing visual inspection of the ears of the person.

16. A collapsible head immobilization device as recited in claim 15, wherein each triangular supporting portion includes a nested internal triangular bracing portion.

17. A collapsible head immobilization device as recited in claim 16, wherein each said internal triangular bracing portion has a height of about a third of a height of each said triangular supporting portion.

18. A collapsible head immobilization device for immobilizing the head of a person relatively to a supporting surface, said head immobilization device comprising a blank of material having a centrally located head receiving portion and a pair of head supporting portions extending laterally from opposite

lateral edges of said head receiving portion and hindgedly attached thereto, said head receiving portion including means for conforming appropriately to a shape necessary to snugly receive the head, each said head supporting portions defining an inner panel provided with an external edge and an outer panel extending laterally from said external edge of said inner panel and hingedly attached thereto, said outer panel including a pair of substantially parallel fold lines defining first, second and third adjacent foldable bracing panels to provide a triangular bracing portion.

19. A collapsible head immobilization device as recited in claim 18, wherein said means for conforming appropriately to a shape necessary to snugly receive the head include a plurality of fold lines allowing the head receiving portion to be so folded as to form a generally semi-cylindrical shape.

20. A collapsible head immobilization device as recited in claim 18, wherein said head receiving portion includes a pair of cutout openings configured and sized to receive the ears of the person, said cutout openings extend across a part of said inner panel.

21. A collapsible head immobilization device as recited in claim 18, wherein each said bracing portion includes a cutout opening between said second and third bracing panels, said cutout opening allowing said bracing portion to conform to the head of the person.

22. A collapsible head immobilization device as recited in claim 18, wherein (a) said third bracing panel includes an outer edge provided with a projecting tab, and (b) said bracing portion includes a corresponding slot provided between said outer panel and said inner panel.

TITLE OF THE INVENTION

HEAD IMMOBILIZATION DEVICE

FIELD OF THE INVENTION

The present invention relates to medical devices. More particularly, the present invention relates to a head immobilization device.

BACKGROUND OF THE INVENTION

It is generally accepted that emergency medical personnel should immobilize the head of an injured patient who has been submitted to a traumatism such that the emergency medical person has reasons to believe that the vertebral and/or cervical spine of the patient has been affected.

These patients are usually secured to a spine board and a cervical collar is installed.

Head immobilization devices have been developed to further immobilize the head of a patient to prevent rotation, anterior and posterior lateral flexions the head.

United States Patent N° 4,928,711 issued to Gary R. Williams on May 29, 1990 and entitled: "Head immobilizer and method for immobilizing" and United States Patent N° 4,964,418 issued to Maximilian J. Wilson on October 23, 1990 and entitled: "Collapsible cervical Immobilization device" are very similar since they both describe head immobilization devices provided with a pair of generally triangular lateral head supporting portions that may be

adjusted to the size of the patient's head through hook and loop type fasteners. The installation of both devices about the head of the patient is similar. First the head of the patient is placed on a base portion. The emergency medical person then forms a substantially semi-cylindrical head receiving portion by folding the triangular lateral head supporting portions. Finally, the emergency medical person manually engages the hook and loop type fasteners to maintain the configuration of the head immobilization device.

The head immobilization devices described by William and Wilson suffer from common drawbacks. A first example of these drawbacks consists in the need for the emergency medical person to manually adjust the width of the head receiving portion, which could lead to an improper immobilisation of the head of the patient or to a greater than required lateral pressure on the head of the patient. Secondly, since hook and loop type fasteners are used to maintain the configuration of the head immobilization device, the complexity of the installation of the head immobilization device is increased. Indeed, the hook and loop type fasteners may accidentally be engaged while the head immobilization device is not in an adequate head immobilization position. To prevent this from happening, the emergency medical person has to carefully position the lateral head supporting portions while maintaining the hook and loop type fasteners away from one another, therefore increasing the complexity of the installation. Furthermore, in certain situations, hook and loop type fasteners may not provide adequate fastening, for example, when body fluids cover the fasteners. A third example of these drawbacks is that the head of the patient rests essentially at the same level than the back of the patient. Therefore, the head is not in a so called "neutral" position for some patients, for example, persons more than 60 years old or weighting more than 200 pounds (91 kg).

United States Patent N° 5,211,185 issued to Geoffrey Garth *et al.* on May 18, 1993 and entitled: "Head immobilizer" describes a head immobilization device provided with a foundation portion to be anchored to a spine board and with a head restraining portion having a band of fastening material, for example tape of hook and loop type fastener, used to immobilize the head of the patient. The head restraining portion, when in use, follows the contour of the head of the patient.

Since (a) the adjustment must be done by the emergency medical person, (b) the head immobilization device uses tape or hook and loop type fasteners to maintain the configuration of the head immobilization device and (c) the head of the patient rests at about the same level as the back of the patient, the above mentioned drawbacks of the head immobilization devices of Williams and Wilson apply to the head immobilization device of Garth *et al.*

United States Patent N° 5,305,754 issued to Valerie S. Honeywell on April 26, 1994 and entitled: "Head immobilization device" describes a head immobilization device provided with a flat head support sheet onto which the head of the patient rests and a pair of lateral triangular support members maintained in supporting position by hook and loop type fasteners. One side of each support member rests against the head of the patient while another side of each support member rests against one shoulder of the patient.

While the head immobilization device described by Honeywell *et al.* suffers from the drawbacks described hereinabove with respect to the head immobilization devices of Williams and Wilson, it further suffers from additional drawbacks arising from the fact that the distance between the head support members is not adjustable. This head immobilization device must therefore be provided in multiple sizes.

SUMMARY OF THE INVENTION

An object of the present invention is therefore to provide an improved head immobilization device free of the above mentioned drawbacks of the prior art.

More specifically, in accordance with the present invention, there is provided a collapsible head immobilization device for immobilizing the head of a person relatively to a supporting surface, the device comprising a pair of lateral sections and a central section extending therebetween; the central section being configured to receive the head in a spaced relationship relatively to the supporting surface.

According to another aspect of the present invention, there is provided a collapsible head immobilization device for immobilizing the head of a person relatively to a supporting surface, the device comprising an essentially flat foldable element defining a pair of lateral sections and a central section extending therebetween; the central section defining a head receiving portion having an adjustable lateral width; each the lateral section being so configured as to define respective supporting portions supporting the head receiving portion; the supporting portions being so configured as to (a) contact the supporting surface and (b) be laterally movable on the supporting surface so as to adjust the lateral width of the head receiving portion; wherein the lateral movements of the supporting portion provide automatic adjustment of the lateral width of the head receiving portion.

According to yet another aspect of the present invention, there is provided a collapsible head immobilization device for immobilizing the head of a person relatively to a supporting surface, the head immobilization device

comprising a blank of material having a centrally located head receiving portion and a pair of head supporting portions extending laterally from opposite lateral edges of the head receiving portion and hindgedly attached thereto, the head receiving portion including means for conforming appropriately to a shape necessary to snugly receive the head, each the head supporting portions defining an inner panel provided with an external edge and an outer panel extending laterally from the external edge of the inner panel and hingedly attached thereto, the outer panel including a pair of substantially parallel fold lines defining first, second and third adjacent foldable bracing panels to provide a triangular bracing portion.

Other objects and advantages of the present invention will become more apparent to one skilled in the art upon reading of the following non restrictive description of a preferred embodiment thereof, given by way of example only with reference to the appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the appended drawings:

Figure 1 is a plan view of a blank of an unassembled head immobilization device according to an embodiment of the present invention;

Figure 2 is a perspective view of an assembled head immobilization device from the blank illustrated in Figure 1;

Figure 3 is a top plan view of a spine board provided with a harness;

Figure 4 is a top plan view of an assembled head immobilization device from the blank illustrated in Figure 1, used to immobilize the head of a person attached on a spine board;

Figure 5 is a sectional view taken along line 5-5 of Figure 3; and

Figure 6 is a sectional view taken along line 6-6 of Figure 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now to Figure 1 of the appended drawings, illustrating a plan view of a blank of an unassembled head immobilization device 10 according to an embodiment of the present invention, the various portions of the blank will be described.

The blank of the unassembled head immobilization device 10 is generally rectangular and includes a central section 12 and a pair of identical lateral sections 14 and 16 extending laterally from lateral edges 18 of the central section 12. For clarity purposes, only lateral section 16 will be further described in details herein.

As will be described hereinafter, the central section 12 will form, when assembled, a head receiving portion and the lateral sections 14 and 16 will form, when assembled, respective lateral head supporting portions.

The central section 12 has a plurality of closely spaced fold lines 20 (illustrated in dashed lines), that will form a generally semi-cylindrical head receiving portion.

The lateral section 16 includes an inner panel 22 and an outer panel 24 extending laterally from a lateral edge 26 of inner panel 22. The inner panel 22 is hingedly attached to a lateral edge 18 of the central section 12 via a fold line 28, while the outer panel 24 is hingedly attached to the lateral edge 26 via a fold line 30.

The outer panel 24 is divided in three bracing panels 32, 34 and 36 by pair of substantially parallel fold lines 38 and 40. The bracing panel 36 includes a generally arrow shaped projecting tab 42, the purpose of which will be described hereinafter.

The central section 12 includes a pair of symmetrical cutout openings 44, 46. As illustrated, the cutout opening 46 extends across part of the inner panel 22 and defines a rectangular portion 48 in the central section 12 adjacent to a triangular portion 50 in the inner panel 22. The rectangular potion 48 includes an arrow shaped projecting tab 52 attached to the central section 12 via a fold line 53, the purpose of which will be described hereinafter.

The lateral portion 16 includes two cutout openings 54 and 56. The cutout opening 54 is provided at the junction between the inner panel 22 and the outer panel 24, i.e. essentially aligned with the fold line 30, and is configured and sized to receive and to secure the projecting tab 42 therein. The cutout opening 56 is provided at the junction between the second bracing panel 34 and the third bracing panel 36, i.e. essentially aligned with the fold line 40, and is configured and sized to receive and to secure the projecting tab 52 therein.

To assemble the head immobilization device 10, the user generally follows the following steps: first the outer panel 24 is folded along fold

lines 38 and 40. The projecting tab 42 is then inserted in the cutout opening 54. A bracing portion 58, see Figure 2, having a triangular cross-section is thus formed by the three bracing panels 32, 34 and 36.

The inner panel 22 is then folded along its lateral edges, i.e. along fold lines 28 and 30, so as to place the bracing portion 58 below the inner panel 22 as can be seen in Figure 2. The projecting tab 52 may then be inserted in the cutout opening 56 of the bracing portion 58 to yield a lateral head supporting portion 60.

It is to be noted that the height of the bracing portion 58 (see arrow 59 in figure 2) is about a third of the height of the head supporting portion 60 (see arrow 61 in figure 2). It has been found that this proportion between the height of these two elements provide an adequate support of the head of a patient while allowing the emergency medical person to use a KED (Kendrick Extrication Device) when required.

Finally, the central section 12 is folded along the plurality of fold lines 20 to yield a generally semi-cylindrical head receiving portion 64.

As can be better seen from Figure 2, the head immobilization device 10 provides a pair of rectangular apertures 48 in which the ears of the patient may be positioned to prevent excessive lateral pressure, and a pair of triangular apertures 50 allowing visual inspection of the ears of the patient by the emergency medical person.

As can be seen from Figures 2, 5 and 6, each lateral supporting portion 60 defines a generally triangular cross-section provided with a base 61

adapted to contact a support surface and with an opposite apex 62 from which the head receiving portion 64 extends.

When the head immobilization device 10 is assembled as illustrated in Figure 2, it may be used to immobilize the head of a patient.

As will be obvious to one skilled in the art, when a patient is in need of a head immobilization device 10 according to the present invention, this person must first be installed on a spine board 66 as illustrated in Figure 3 of the appended drawings. Typical spine boards are provided with extremity apertures 68 and lateral apertures 70.

Figure 3 also illustrates a harness 72 removably mounted to the spine board 66. The harness 72 includes a pair of mounting straps 74, 76 each inserted in on extremity aperture 68 and one lateral aperture 70. The harness 72 also includes a pair of transversal head immobilization device securing straps 78, 80 that are so mounted to the mounting straps 74, 76 as to be longitudinally displaceable (see arrows 82, 84) along the mounting straps 74, 76, respectively, to allow the straps 78, 80 to be positioned in adequate head immobilization device securing positions. Indeed, each securing strap 78, 80 include a portion extending over one of the mounting straps 74, 76 and a portion (no shown) extending under the mounting straps 74, 76, the two portions of each straps being fixedly secured to one another. Of course, each securing strap 78, 80 includes a pair of conventional cooperating fastening elements 86, 88 used to adjustably and releasably attach opposite ends of the straps 78, 80 together.

In operation, when the emergency medical personnel is confronted with a case where the immobilization of the head of a patient is

required, the spine board 66, to which the harness 72 is mounted, may first be placed under the patient. The blank, unassembled, head immobilization device 10 of Figure 1 is then folded according to the instructions given hereinabove to yield the assembled head immobilization device 10 illustrated in Figure 2.

The emergency medical personnel may then longitudinally slide the head receiving portion 64 under the head of the patient.

It is important to note that after the head receiving portion 64 is slid under the head of the patient, the lateral head supporting portions 60 are automatically positioned against the side of the head of the patient since they are not attached to the spine board 66 and may thus be laterally moved. Of course, manual positioning may be performed by the emergency medical personnel simply by laterally moving the lateral supporting portions 60. The width of the head receiving portion 64 is therefore automatically adjusted to the size of the head of the patient, providing enough lateral pressure for adequate head immobilization and preventing excess lateral pressure.

When the emergency medical person is satisfied with the position of the head immobilization device 10, the securing straps 78, 80 may be secured via respective fastening elements 86, 88 to adequately maintain the head of the patient in the head immobilization device 10 (see Figure 4).

As can be seen from Figure 4, the securing strap 78 is advantageously extended on the forehead of the patient and the securing strap 80 is advantageously extended on the chin of the patient. Of course, the jugement of the emergency medical personnel is required to adjust the securing straps 78 and 80 so that the head of the patient is firmly maintained in the head immobilization device 10 without applying excess downward pressure.

Turning now to Figure 5, is it to be noted that the head of the patient does not rest on the spine board 66 but is received and maintained at an adequate distance 90 from the spine board 66. The distance 90 varies with two main factors. First, the distance 90 increases with the size of the head of the patient. Second, the distance 90 decreases when the length of the central section 12 (see Figure 1) of the head immobilization device 10 increases. It is possible to simultaneously control these two factors by producing a reduced number of sizes of head immobilization devices. It has been found that two sizes are usually sufficient to provide satisfactory head immobilization for the majority of people.

The medium size head immobilization device is intended for adult less than 60 years old or weighting less than 200 pounds (about 91 kg). It has an overall length of about 12 inches (about 0.3 metres) and has a central section 12 having a length of about 6 inches (about 0.16 metres).

It is to be noted that the small and medium size head immobilization devices described hereinabove are not identical to the head immobilization device 10 illustrated in Figures 1-6. Indeed, for children and adult less than 60 years old or weighting less than 200 pounds (91 kg) it is not required that the head be received and maintained at a distance from the spine board 66 to provide a neutral position, the head may rest at the spine board level.

The large size head immobilization device is intended for adult more than 60 years old or weighting more than 200 pounds (91 kg). It has an overall length of 12 inches (about 0.30 meters) and has a central section 12 having a length of 6 inches (about 0.16 meters). The distance 90 separating the

head receiving portion 64 and the spine board 66 is about one half inch (about 1 cm).

As can be seen from Figure 6, the back of the neck of the patient does not rest on the head receiving portion 64. Figure 6 also illustrates the projecting tabs 52 inserted in the corresponding apertures 56.

It is to be noted that, when the head immobilization device 10 of the present invention is used in conjunction with a spine board 66 and a harness 72 securing the person to the spine board, it is possible to put the person in a lateral emergency position, while maintaining the head in a neutral position.

As will be easily understood by one of ordinary skill in the art, the head immobilization device of the present invention may be stored in an unassembled position in emergency vehicles and may be easily and quickly assembled when required.

The head immobilization device of the present invention is advantageously made of corrugated cardboard material, making it a disposable device. It is however to be noted that it could also be made of other materials, for example, coated corrugated cardboard, corrugated plastic material or any other material that may easily be folded along predetermined fold lines while maintaining a required structural integrity to properly immobilize the head of a patient.

It is to be noted that other types of harness could be used to safely maintain the head of the patient in the head immobilization device 10.

Also, the head immobilization device 10 could be used to immobilize the head of a person relatively to other supporting surfaces than a spine board 66.

Although the present invention has been described hereinabove by way of a preferred embodiment thereof, this preferred embodiment can be modified at will, without departing from the spirit and nature of the subject invention as defined in the appended claims.

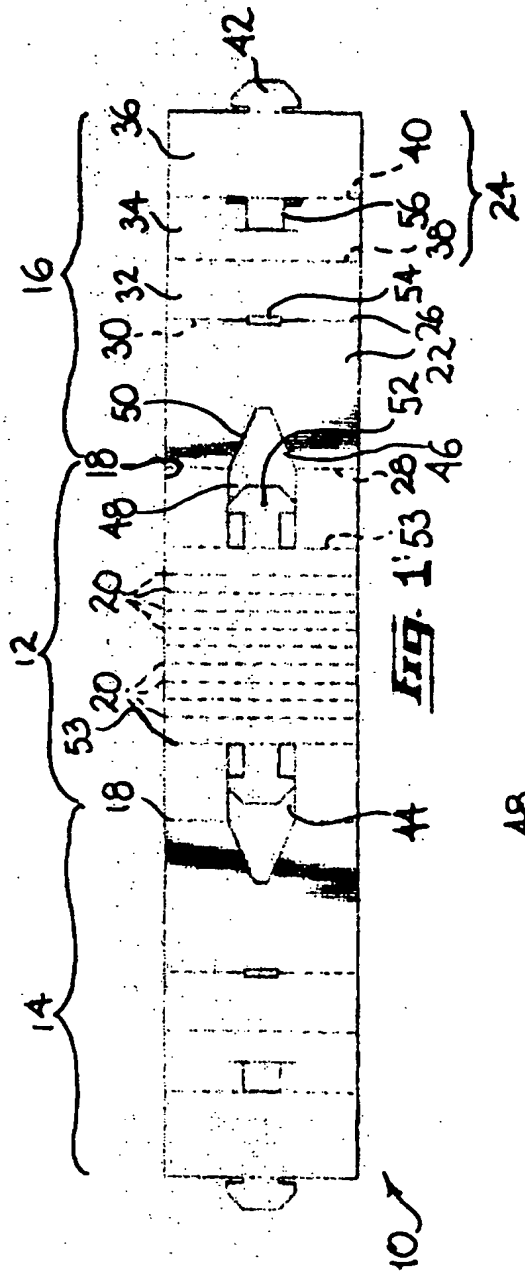

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Fig. 1

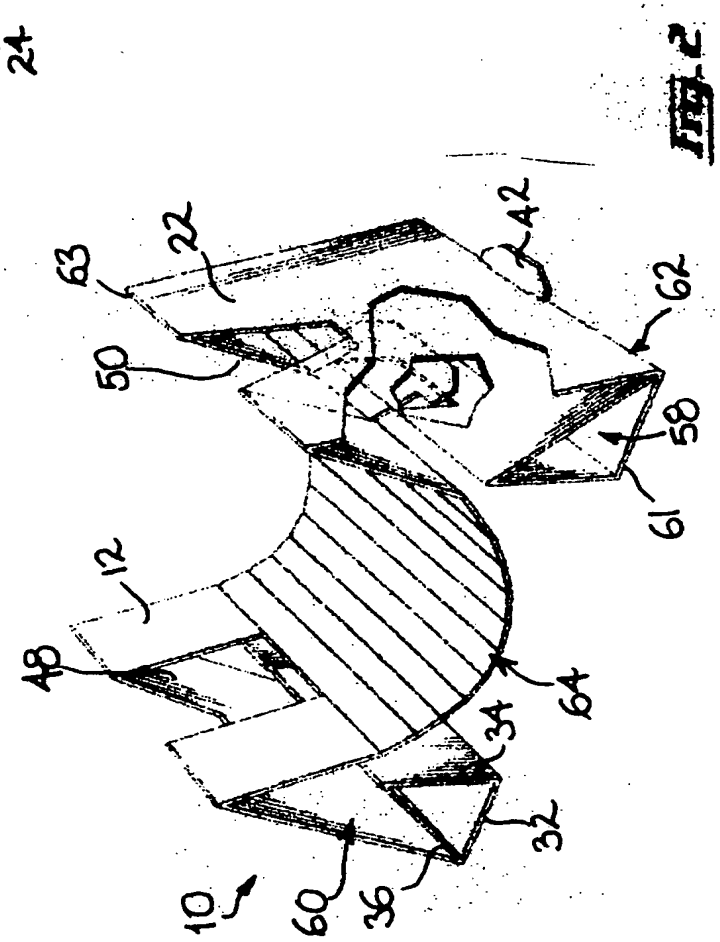
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Fig. 2

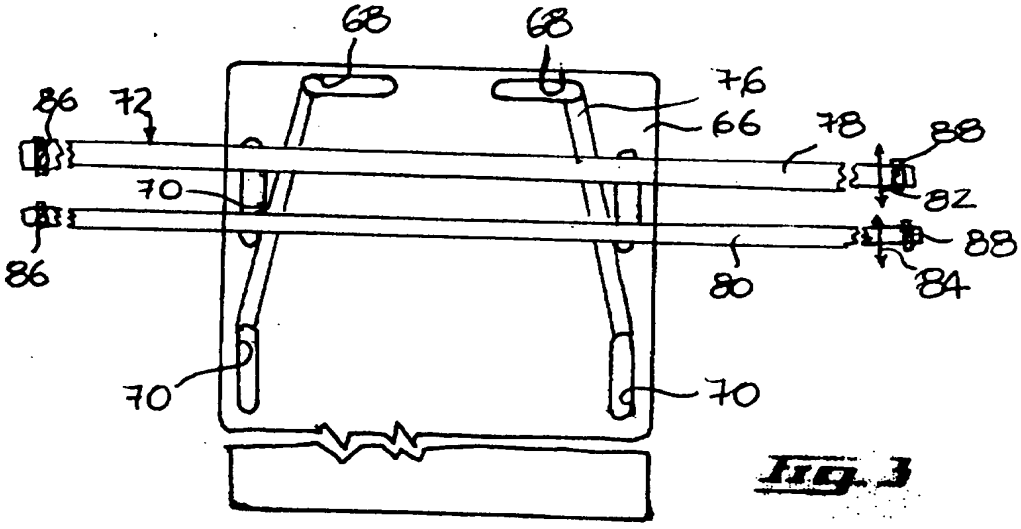


fig. 3

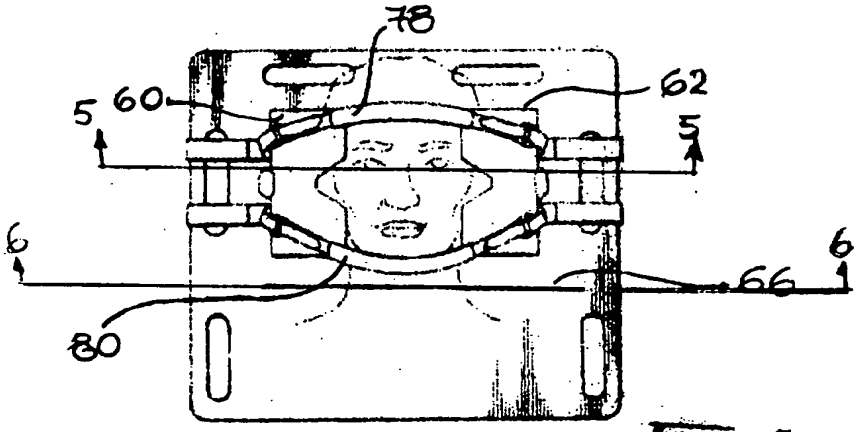


fig. 4

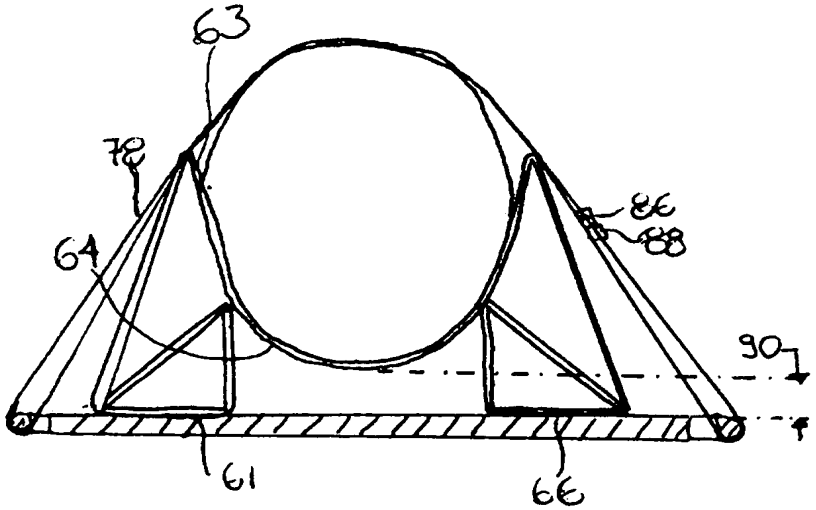


fig. 5

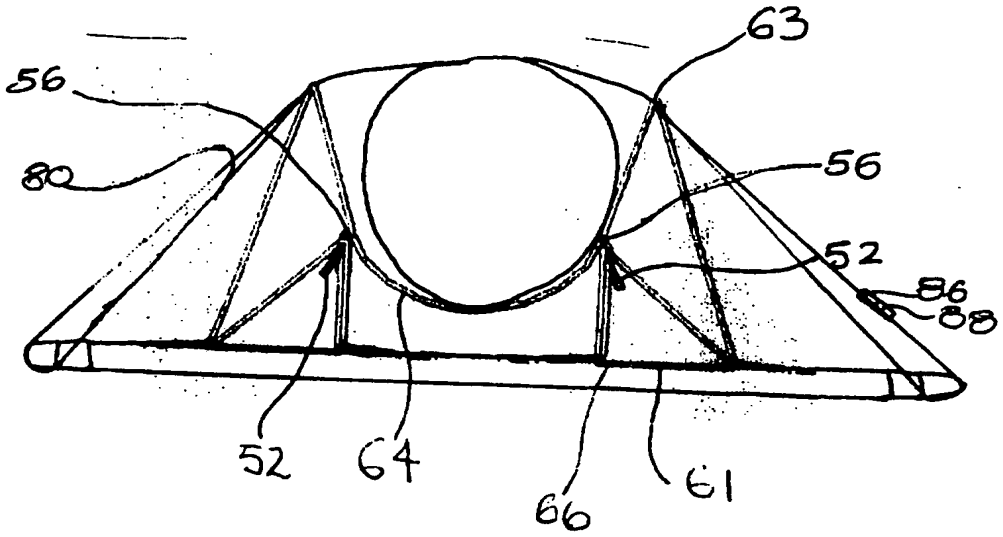
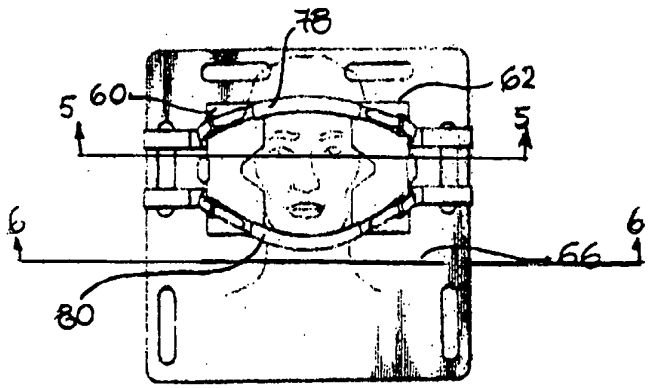


Fig. 6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